Synopsis for PhD Thesis

Entitled

“Planktonic Diversity Evaluation of Manar Water Reservoir in Relation to Nutrient Cycle Studies”

To be submitted to

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By

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A BRIEF RESUME OF PROPOSED WORK

Plankton is an important contain of an aquatic ecosystem for the productivity of an aquatic environment is directly be consist with the density of plankton, The availability of plankton maintain food chain in an aquaticecosystem. The Manar reservoir has an ecosystem contain biodiversity of plankton's and fishes.

The present study is based on water quality specially pollution in any and analyze the nutrients of this dam and its role in fresh water bodies with impact of agricultural waste on water quality correlating in aquatic food chain and nutrient analyze with physico-chemical parameters like (Temperature pH, DO, BOD, PO_4, SO_4, NO2-N, NH_3 etc.) and two heavy metals Fe and Mn which shows the nutrient relation effect on planktonic diversity.

This study will be help to the water quality management strategies for future development and management of water reservoir.

(Keyword: - Manar water reservoir, Phytoplankton and Zooplankton)

INTRODUCTION

PLANKTON

The Plankton name is Greek adjective which mean is uncontrollable and transgressing and by extension “wanderer “or traveler. It was termed by victor Henson (1887). They are small microscopic plants and animals mostly found in and around euphotic zone in an ecosystem, consisting chiefly of diatoms, protozoan’s, small crustaceans and the eggs and larval stages of larger animals.

The planktonic individual is considering as plankter. Due to limited locomotion, plankton freely float in epilimnion and drift with water currents. Plankton is the different type of organism contributions living in the water are unable to swim against the flow.

They provide a major source of food for many large aquatic living lives e.g. Fish and whales’ etc. The planktonic research is called as Planktology is the branch of limnology.

They are divided in to tropic groups Such as

1) Phytoplankton

- It contain plants like algae which live near water surface,

2) Zooplankton

- The animal organisms depend on phytoplankton

3) Bacterioplankton

- It contain Bacteria and archaea organism

4) Mycoplankton

- It contains fungi and fungus-like organisms, plays important role in nutrient cycling as bacterioplankton.

PHYTOPLANKTON

Plankton consisting of microscopic plants is called as phytoplankton. It is an autotrophic, prokaryotic or eukaryotic group. It is also called as producer components of planktonic society for the photosynthetic process. They release oxygen in to the water. This photosynthesis process controlled the atmospheric carbon monoxide (CO). If phytoplankton shows any changes due to natural and human activities it directly affect on aquatic food chain. Phytoplanktonare eaten by zooplankton, aquatic insects, fish and other organisms. Phytoplankton has some important groups like diatoms, cynobacteria, dinoflagellates and coccolithophores. For the production of fish culture phytoplankton can be produced by artificial condition is itselffarm of aquaculture.

ZOOPLANKTON

Plankton consisting of small animals and the immature stage of larger animals is called as zooplankton.It is a heterotrophic group it is also called as primary consumer components of planktonic society. It absorbs energy from sunlight and nutrients from the water for their self food production.

Individual zooplankton are usually microscopic but some are larger in size and visible with the naked eye's e.g. jellyfish. Zooplankton feeds on bacterioplankton, phytoplankton other zooplankton, detritus and even nektonic organism. Zooplankton

absorb the large amount of carbon stored in phytoplankton when it dies carrying carbon in to the bottom of the ocean or where it lives in that water source.(River, Lakes, pond's etc.)It also play important role for the nutrient transfer and the cycling of decomposed organic matter. In an ecosystem 90% of zooplankton species are herbivorous, remaining 10% being carnivores.

Zooplankton derived from the Greek word (zoon) meaning is "animal".The zooplankton of pond and lakes are dominated by three members of group viz. Rotifera, Cladocera and Copepoda.

ROLE OF PLANKTON

Plankton is the main source of aquatic food and it recycles nutrient in water ecosystem. Phytoplankton plays an important role in oxygen production during photosynthesis. Availability of algae in water increases chlorine demand and disinfection of byproduct formation. Some algae are caused by the taste and smell of water .g.e*Anabaena sp.* and *Synura sp.*Phytoplankton protect the sediment near the wetland area. It also prevents flood.

PLANKTONIC UTILITY AND IT'S ROLE IN FOOD CHAIN ECOSYSTEM

According to the study of Pooja (2014),the brown algae was used as antiviral for the control of herpes viruses.It also has marine algae sp. It is used for the creation of food, dairy, pharmaceutical, cosmetic, and bioethanol, biodiesel.Similarly the use of Blue green algae as a biofertilizer for agriculture helps to increases the amount of nitrogen in the soil. The sp. of *Nannochloropsis oculata, Neochloris oleoabundans.*Algae are useful for the formation of biodiesel because it has high level of lipid that has capacity to biodiesel.

Show et al.(2017)studied that some of the algae species have special properties that use antiviral, antioxidant, anticancer as a medicine. Likewise algae can be used as protein oil, which contains carbohydrates, vitamins and minerals. Thus algae are used in human consumption as a nutrient in daily use.Similarly the growth of phytoplankton was better if it was sufficient for those elements they needed. They learned that they can become important in ammonia followed by carbon after nitrogen in the study.

Kuppusamy etal.(2017), has found that the use of diatom culture in microorganisms can be used for biological therapye.g. *S.costatum, Rhizosole sp*.

Plankton is considered as important component of food and nutrient in all areas of the world. The use plankton makes it very high in the food chain.It is used for both aquatic and geological species e. g. Water tiny warms, fish, larve are dependent onalgae .Large fish also dependant on the life-style of the algae. So the algae is called as primary producer. It is used as protein and food. He has also using zooplankton and living on thatalgae as food and vitamins, proteins and is doing ittoday.

FRESH WATER POLLUTION

Water is an essential component of industrial and domestic work. Similarly, it is used in drinking and agriculture purpose. Fresh water pollution is the contamination of inland water with substances that make it unfit for its natural or intended use. Today'smanmadethrough domestic water sewage,litter waste and industrialization pesticide, fertilizers, metals like Fe, Mn andalso nutrients' like N,P,and K, in the field mix with some rain water causes river get polluted.

LITRATURE REVIEW

According to studies by Summarwar, (2012) plankton plays an important role in an aquatic environment. It maintains the food chain of aquatic ecosystem. If the quantity of floating plankton increases on surface of water it turns to water pollution and affects on planktonic diversity as well as biomass of the plankton.

Singh, (2015) worked on kunda pond of town Deeg (Bhartpur) Rajasthan. He analyzed water pollution by physical, chemical and biological parameters and observed organic, inorganic and microbial loads observed. It affected the quantity and quality of water. It is due to human activities and natural way.

Basically some elements are most important for the phytoplankton like phosphate, silicates and nitrogen which is directly correlated with amount of phytoplankton. This proves that the compactness of phytoplankton is parallel to fishery production in aquatic ecosystem (Nilgule et al. 2016).

Phytoplankton is an important source of carbon in photosynthesis activity to the aquatic ecosystem. It is primary producer and first-link to in life which depend on it for food purpose. In Food chain it helps as a source of oxygen(Sharma et al. 2015).

When the studied of Indian lakes with some parameters like Temperature, Sunlight penetration, Water pH, Wind, Transparency. There is seasonal variation in water Characters', nutrient enrichment and prey-predator changes observed. It shows that aquatic ecosystem some ecological fact affects have relation with these factors at particular level. It is beneficial for the growth of phytoplankton (Giripunje et al. 2013).

Phytoplankton maintains the food chain in aquatic ecosystem help to regenerate life cycle nutrient in water ecosystem balance. Photic zone of fresh water and marine ecosystem provides the food for bird's and small living thing near the water shore (Drakare, 2002).

According toAhmad et al.(2010),Group of Eustigmatophytes *Nannochloropsis sp*.Microalgae strain is supplied with required amount of nutrient light, temperature, pH, air (Carbon dioxide) provide have capacity to generate oil. This can be used as biodiesel.

Mukhaerjee et al.(2010) studied the celestial lake in Ranchi and realized that internal or state variables get daily detergent input in the form of washing of various commodities in the lake .Therefore the concentration of carbon,phosphate,nitrate and sulphate was higher in that place.BOD andCOD were also found to be very high.

Raut et al.(2015) proved that zooplankton can be represented by bio-indicator of pollution. About19 indicator species out of 22 were found which indicates the high organic pollution in borna dam.

STUDY AREA

Manar water reservoir will be used for the study of plankton. This Manar dam is the upper medium irrigation project is being a constructed in the Godavari basin in Nanded district of Maharashtra. Manyar dam is situated at Barul camp. Taluka Kandhar district Nanded across Manar river which is tributary of Manjra river that emptities in to Godavari river it is also called as Mannyad nadi. Manar river has origin at Dharmapuri in Beed district and it passes through Ahmadpur in Latur district is also the plains in middle

and south of Nanded district after which it flows in an easterly direction to join the Manjra. This dam was opening date in 1968 for the irrigation and small scale fishing. The height of the dam is 27m. (89ft.) and the length is 2,592m. (8,504 ft.)

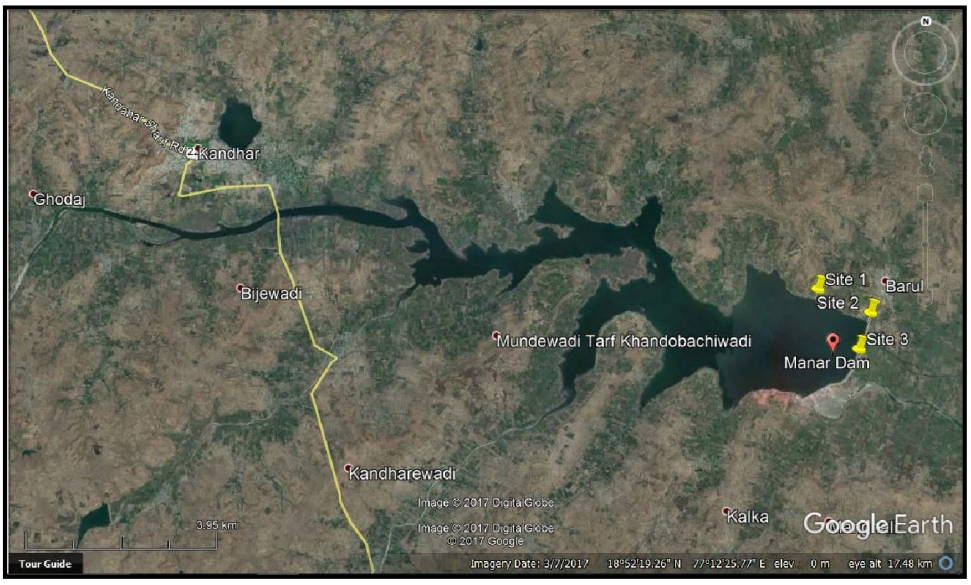

Figure: Manar Dam, Barul, Tq. Kandhar, Dist. Nanded.

The Manar reservoir has an ecosystem contain biodiversity of plankton and fishes. The present study is based on water quality and diversity of plankton of Manar reservoir with some physico-chemical parameter like pH, DO, PO_4, SO_4, NO_2, NH_3 and some heavy metals Fe and Mn. which is showing this nutrient relation affects on planktonic diversity.

OBJECTIVES OF RESEARCH

1) To study the water quality of Manar dam specially pollution if any.

2) To analyze the nutrients of this dam and its role in fresh water bodies.

3) To study the Planktonic diversity i.e. Zooplankton and Phytoplankton (selected 10sp.each).

4) To study the impact of agricultural waste on water quality correlating in aquatic food chain.

5) To study the water quality management strategies for future development and management of water reservoirs.

METHODOLOGY

Nutrients and metals transported from silts, rocks, domestic and agricultural runoff etc.grt transported in to nearby water bodies. These nutrients and metals plays important role in human and aquatic living life consumption. These nutrients and metals are required to investigate in which essential for our life hence this parameters and metals nutrients use for the study purpose.

The investigation of these nutrients in an aquatic food chain mainly in water and sediment will be carried out planktonic identification study and its diversity will also find out in the selected area of Manar dam.

WATER ANALYSIS

The sample will be collected from the selected three sites at Manar dam the samples will be collected in polythene plastic bottles with the caps. The standard and widely used methods will be applied for the analysis. The water samples' will be brought in the laboratory for further systematic analysis. The water sample once in month near about two years and for also the planktonstudy it collected with same period and time.

1. TEMPRATURE

It has more importance to life of an aquatic ecosystem especially for phytoplankton. In water temperature affects on chemical and biochemical reaction in the organism. It importance to determine the pH, conductivity and amount of gaseous level stored in water and calculation of various forms of alkalinity and also useful in detecting an unsuspected source of pollution.

2. pH

The potential of hydrogen is the figure of expressing the acidity and alkalinity of a solution on logarithmic scale on which particle pH scale extends from 0 to 6.99 as Acidic, 7.0 as Neutral and 7.01 to 14 as Alkaline. The ($pH = -\log 10^{c}$) where c is the hydrogen ion concentration in moles per liter. The ph is widely used for primary treatment of water and waste water treatment.

3. PHOSPHATE (PO_4)

It is an essential source for plants and animal and for aquatic plant to growth and carry out metabolic, reactions. The phosphates are an inorganic chemical and are the salts of various phosphoric acids. The forms of phosphate are orthophosphate, condensed phosphate, and organic phosphate. In organic chemistry a phosphate or organophosphate is an ester of phosphoric acid.

The phosphoric acids and organic phosphates and phosphate have more importance in biochemistry and biogeochemistry (ecology) and inorganic phosphate are mined to obtain phosphorus use in agriculture and industry.

4.NITRITE-NITROGEN (NO_2-N)

Under anoxic condition, NO_3-N is converted to elementary nitrogen via the intermediate products is NO_2-N and NO_2 it is highly toxic at high concentration in fish. Nitrite it is toxic because it affect the blood hemoglobin's which has ability to carry oxygen.

It enters in to bloodstream it oxidizes the iron in the hemoglobin molecule from the ferrous state to the ferric state causes methemoglobin it has brown color characteristics hence that common name is "brown-blood disease". It is also important in agriculture for the crop production. In water availability of it indicates organic pollution.

5. AMMONIA (NH_3)

Ammonia is the colorless gas with pungent odor it noticed at above 50ppm concentrations'. It is highly soluble in water. It is poisonous when it inhaled in large amount and irritating to eyes, nose and throat in lesser amount. It also harmful reacts when mixed with air and mainly with oxygen.

In the fertilizers manufacturing industry, coke manufacturing, fossil fuel combustion, livestock management and refrigeration method it also used. In specific quantity availability of it for plants, crops, phytoplankton it act as boost for the growth of them.

6. SULPHATE (SO_4)

Sulphate is a combination of sulfur and oxygen and part of naturally occurring minerals in soil and rock formation that contain water. It can causes scale buildup in water pipes similar to other minerals and it may be contain with bitter test in water that can cause laxative effect on human being and young livestock.

If the amount is approximately 250mg/l as the sodium salt causes corrosion of distribution system. Sulphate and sulfuric acid product used for the formation of fertilizers, chemicals, dyes, glass, paper, soaps, textiles, fungicides, insecticides, astringents and emetics.

It is also used in mining, wood pulp, metal and planting industries, in sewage treatment and leather processing, Aluminum sulphate (alum) it is used as a sedimentation agent in water treatment of drinking water. And copper sulphate used for algae treatment in raw and public water supplies

7. DISSOLVED OXYGEN (DO)

Dissolved oxygen gives an idea about water purity, because it is the principal parameter responsible for the self purification of water. Deficiency of oxygen in purified water it gives rise to taste and odor problems it causes water impurity means water pollution increases it shows hence in water dissolved oxygen contain importance for the purpose to purity and healthy water.

8. BIOCHEMICAL OXYGEN DEMAND (BOD)

BOD measure the amount of oxygen consumed microorganism in stabilizing the organic matter. It is the demand of sewage or polluted water and the amount oxygen required for the biological decomposition of dissolved organic matter to occur under aerobic condition and at the standardized time and temperature.

For the measuring BOD amount in the water it required 5 days at $20^{\circ}C$ as per the global standard. The B.O.D.test is among the most important method in sanitary analysis to determine the polluting power or strength of sewage, industrial wastes or polluted water, Outcome is in mg/L

9. IRON (Fe)

It present in water both of its soluble (as ferrous iron and insoluble as ferric iron) forms. Iron is a trace element it required by plants and animal also for microbial system. It is an essential element for human being to perform vital role in the human physiological system.

Iron importance to human being in the form of hemoglobin and myglobin these two are important source of oxygen carrying proteins in vertebrates through the blood cells. When the iron concentration more than 0.3mg/l may cause discoloation of water. If the concentration of iron 1mg/l or above than it causes encourages the growth of micro-organism which when remain persistent causes water turbidity increases and offensive odor,

10. MANAGANESE (Mn)

Manganese constantly found in the bottom contents of the ponds and reservoirs. It is grayish white metal it occurs in cells of living organisms. The divalent and trivalent compound of manganese are soluble in water where as the tetravalent form of manganese forms colloidal suspension, manganese concentration rises more than 0.1mg/l in purified water causes slight discoloration of water and if the concentration rises more than 0.3mg/l causes problem of taste, color and turbidity increases in water.

If the availability of it in to the water it causes micro-organism increases in water and form odor in the water. Manganese it is use for plant and animal as a source of nutrient.

11. PHYTOPLANKTON IDENTIFICATION

Phytoplankton is different in their size, biomass and distribution and collection of their samples posses' practical difficulties Due to nutrient high presence or less may diversity posses in phytoplankton biomass. Thus the phytoplankton volume of sample to be filtered through the fixed mesh size net is helpful to the phytoplankton collection.

The Plankton samples will be collected using a plankton net then transfer sample through funnel in to polythene bottle. Collected sample of phytoplankton preserved by adding 5to 10 ml of Lugol's iodine. Normally sedimentation requires 24hrs.

After which the sediment is collected after removing supernatant with the help of droper or pipette. If the sample content with sedimented phytoplankton is diluted by adding the distilled water can once again preserved in Lugol's iodine for subsequent studies. Then to identifying the phytoplankton species will be use common glass slide mounted with a drop of concentrated phytoplankton sample by adding glycerol and covered with cover slip will be placing under the microscope provided with mechanical stage to phytoplankton species identification.

12. ZOOPLANKTON IDENTIFICATION

Zooplankton is also small in size like phytoplankton and is one of the most important ecological parameters in water quality assessment. Water bodies rich in phytoplankton are also rich in zooplankton diversity and biomass.

Zooplankton is bioindication of pollution and biological monitoring. For zooplankton sample collection same mesh net use i.e. Plankton net will be use. For longer duration preservation of collected sample of Zooplankton will be adding 5to 10 ml of Lugol's iodine. For the identification of Zooplankton same method as per above the phytoplankton will be utilized.

IMPORTANCE OF STUDY

INTERNATIONAL STATUS

If the world level considered aquatic plankton then it can be found in two areas of fresh water and marine water ecosystem. Because of their environment, they are favorable for their growth. They play an important role in aquatic life, they provides essential nutrients food, and food products to the living organism so that it is important to water the food chain.

There are some algae sp. Has special properties to absorb toxic pollutant and trace element It is also used as source of nutrient,food,carbohydrate and vitamins purpose as well as medicine.Some factors are important for growth of algae,metals in which they work as nutrients and the environment around them also affects their growth. If they are studied then it will be convenient for the future. Such are some algae’s sp.

There are those that can also be artificially enhanced by you. So we can grow and

use them wherever we want. If youunderstand which and how many of them are according to their category,will help in the future.After studying all these factors,this study will make important contribution to the future.

NATIONAL STATUS

Plankton plays an important role in a Global Warming control. It also balances aquatic life. It has importance in medicinal, food nutrient, biodiesel, bioethenol etc. Now a day's various industries work on algae sp. For energy and nutrient production. In India for various research working on algal importance and socially aware to people how biotechnical importance of algae different sp. e.g. in Tamilnadu Oilgae club has work on algae different character. It will help to India's people for getting natural nutrients, medicine.

SCOPE OF STUDY

Manar water reservoir, Phytoplankton and Zooplankton. The research will identify the specific species of phytoplankton and zooplankton in Manar dam. Similarly, the environment of Manar dam will show whether or not it is necessary for the growth of plankton. If there is a need for such medicinal, protein or vitamin containing algae sp. If found if the atmosphere is favorable, then they will be able to artificially increase their use.Similarly, this research can be used for research studies of Manar dam.

STRUCTURE OF RESEARCH WORK PLAN

Time (Month)	Work
00-06	Review of Literature and Procedure Preparation
06-30	Analysis of Water Sample and publishing research papers.
30-36	Data Collection/Statistical Interpretation, Writing of Thesis

EXPECTED OUTCOMES

Manar dam water tank of plankton affects the food waste of the area in that area. The elements are mixed naturally with water and later they bring changes in the plankton's food chain. These components are mainly nitrogen, phosphorous, ammonia and sulphate.

For this reason there are changes in the life of some of zooplankton and phytoplankton sp. These components can be used as nutrients.But this factor can increase the amount of zooplankton and phytoplankton, which will result in the increase in the amount of BOD in the water, which can interfere with the water of Manar dam.

Similar temperature and also iron and manganese they are affected. According to this estimate, if the water is not checked for the quality of the farm, then this water could decline in the production of agriculture. Similarly, if the use of water for drinking water without bio-treatment, some toxic algae will have bad effects. From this research, some of zooplankton and phytoplankton sp. Will be introduced which are available in Manar dam. It will be used for the plankton research of Manar dam in the future.

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